

CLAIMS

I claim:

1. A method of stabilizing a vertebral body, comprising:
securing a first rod to a first vertebrae in a manner that substantially prevents movement of the first rod relative to the first vertebrae;
securing a second rod to a second vertebrae; and
slideably coupling the first rod and the second rod together at a first connector positioned between a first point where the first rod is coupled to the first vertebrae and a second point where the second rod is coupled to the second vertebrae;
wherein the first rod and the second rod remain in a slideable relationship relative to each other post-operatively.
2. The method of claim 1, wherein slideably coupling the first rod and the second rod together at a connector comprises inserting a portion of the first rod through a first aperture in the connector forming a slideable connection and inserting a portion of the second rod through a second aperture in the connector.
3. The method of claim 2, wherein inserting a portion of the second rod through the second aperture in the connector comprises forming a slideable connection between the second rod and the second aperture.

4. The method of claim 2, wherein inserting a portion of the second rod through the second aperture in the connector comprises fixedly attaching the second rod to the second aperture.

5. The method of claim 1, further comprising installing a spinal joint stabilization device displaced laterally from the first connector to enable post-operative movement of the first and second vertebrae relative to each other and to enable the first and second rods to move relative to each other.

6. The method of claim 5, wherein installing a spinal joint stabilization device comprises securing a first rod to a first vertebrae in a manner that substantially prevents movement of the first rod relative to the first vertebrae, securing a second rod to a second vertebrae, slideably coupling the first rod and the second rod together at a second connector positioned between a first point where the first rod is coupled to the first vertebrae and a second point where the second rod is coupled to the second vertebrae; and wherein the first rod and the second rod remain in a slideable relationship relative to each other in a patient post-operatively.

7. The method of claim 5, further comprising installing a transverse member coupling the spinal joint stabilization device with the first connector.

8. The method of claim 1, wherein securing a first rod to a first vertebrae comprises attaching a first post to the first vertebrae and attaching the first rod to the first post in a manner enabling the first rod to slide relative to the first post generally parallel to a longitudinal axis of the first rod post-operatively.

9. The method of claim 8, wherein attaching the first rod to the first post comprises passing the first rod through an aperture in the first post.

10. The method of claim 8, wherein securing a second rod to a second vertebrae comprises attaching a second post to the second vertebrae and attaching the second rod to the second post in a manner enabling the second rod to slide relative to the second post along a longitudinal axis of the second rod post-operatively.

11. The method of claim 10, wherein attaching the second rod to the second post comprises passing the second rod through an aperture in the second post.

12. The method of claim 1, further comprising limiting movement of the first and second vertebrae relative to each other by installing movement limiting devices on at least the first rod.

13. The method of claim 12, further comprising installing movement limiting devices on the first and second rods.

14. The method of claim 1, wherein securing a first rod to a first vertebrae comprises attaching the first rod to a post having a head movable in at least three axes post-operatively.

15. The method of claim 1, wherein securing a first rod to a first vertebrae comprises attaching the first rod to a post having a head enabling the first rod to move post-operatively generally along a longitudinal axis of the first rod.

16. The method of claim 15, wherein securing a second rod to a second vertebrae comprises securing the second rod to a post having a head enabling the second rod to move post-operatively generally along a longitudinal axis of the second rod.

17. A device for stabilizing a vertebral body, comprising:
a first connector assembly formed from a first connector having at least one first aperture slideably receiving a first rod coupled to a first vertebrae and having at least one second aperture for receiving a second rod coupled to a second vertebrae; and
the first rod slideably engaging the first connector in the at least one first aperture;
wherein the first connector is adapted to be located by the first and second rods between the first and second vertebrae and to maintain the slideable connection between the at least one first aperture and the first connection post-operatively.

18. The device of claim 17, further comprising the second rod, wherein the second rod is slideably attached to the connector in the second aperture forming a slideable connection adapted to be maintained post-operatively.

19. The device of claim 17, further comprising the second rod, wherein the second rod is fixedly attached to the connector in the second aperture.

20. The device of claim 17, wherein the first rod is nonlinear.

21. The device of claim 20, further comprising the second rod, wherein the second rod is nonlinear.

22. The device of claim 20, wherein the first rod is formed from a material that is flexible during installation and becomes substantially rigid after installation forming a substantially rigid rod.

23. The device of claim 17, further comprising a first post coupled to the first rod for attaching the first rod to a first vertebrae.

24. The device of claim 23, wherein the first rod is slideably coupled to the first post.

25. The device of claim 23, wherein the first rod is fixedly coupled to the first post.

26. The device of claim 17, further comprising a second post coupled to the second rod for attaching the second rod to a second vertebrae.

27. The device of claim 26, wherein the second rod is slideably coupled to the second post.

28. The device of claim 26, wherein the second rod is fixedly coupled to the second post.

29. The device of claim 17, further comprising at least one movement limiting device for limiting axial movement of the connector relative to the first rod.

30. The device of claim 29, wherein the at least one movement limiting device is formed from an elastic material.

31. The device of claim 29, further comprising at least one movement limiting device coupled to the second rod for limiting axial movement of the connector relative to the second rod.

32. The device of claim 17, further comprising a second connector assembly formed from a connector positioned generally laterally to the first connector assembly and having at least

one first aperture slideably receiving a first rod coupled to the first vertebrae and having at least one second aperture for receiving a second rod coupled to the second vertebrae;

wherein the connector is adapted to be suspended by the first and second rods between the first and second vertebrae and to maintain the slideable connection between the at least one first aperture and the first connection post-operatively.

33. The device of claim 32, further comprising a transverse member coupled to the first and second connector assemblies for transferring forces between assemblies.

34. The device of claim 33, wherein the transverse member is adjustable.

35. The device of claim 34, wherein the transverse member is elastic.

36. The device of claim 17, further comprising a second connector assembly positioned in series with the first connector assembly and coupled to the second vertebrae.

37. The device of claim 36, wherein the second connector assembly is formed from a second connector attached to the second vertebrae and extends in series with the first connector assembly generally away from the first connector assembly, wherein the second connector has at least one first aperture slideably receiving a first rod coupled to the second vertebrae and having at least one second aperture for receiving a second rod coupled to a third vertebrae positioned opposite from the first vertebrae;

wherein the second connector is adapted to be located by the first and second rods between the second and third vertebrae and to maintain the slideable connection between the at least one first aperture and the first connection post-operatively.

38. The device of claim 36, further comprising a plurality of connector assemblies connected in series with the second connector assembly.

39. A device for stabilizing a plurality of vertebral bodies, comprising:
a plurality of connector assemblies coupled together in series, wherein at least one of the connector assemblies comprises:

a first connector having at least one first aperture slideably receiving a first rod coupled to a first vertebrae and having at least one second aperture for receiving a second rod coupled to a second vertebrae; and

the first rod slideably engaging the first connector in the at least one first aperture;

wherein the first connector is adapted to be located by the first and second rods between the first and second vertebrae and to maintain a slideable connection between the at least one first aperture and the first connection post-operatively.

40. The device of claim 39, wherein the plurality of connector assemblies comprises a second connector assembly formed from a second connector attached to the second vertebrae and extending in series with the first connector assembly generally away from the first connector assembly, wherein the second connector has at least one first aperture slideably receiving a first

rod coupled to the second vertebrae and having at least one second aperture for receiving a second rod coupled to a third vertebrae positioned opposite from the first vertebrae;

wherein the second connector is adapted to be suspended by the first and second rods between the second and third vertebrae and to maintain the slideable connection between the at least one first aperture and the first connection post-operatively.

41. A device for slideably coupling a rod to a post for stabilizing a vertebral body, comprising:

a body having a first aperture for receiving a receiver and a second aperture for receiving a post;

the receiver including an aperture for receiving the rod and positioned in the first aperture of the body in manner enabling the receiver and the first rod inserted in the receiver to rotate relative to the body;

a post extending through the second aperture and including an attachment device for attaching the post to a spine;

wherein the post is coupled to the body using an adjustable connector; and

wherein the receiver is sized to permit the rod to slide generally parallel to a longitudinal axis of the rod through the receiver and to restrict movement of the rod generally orthogonal to the longitudinal axis of the rod; and

wherein the slideable movement of the rod in the first aperture is maintained when the device is in use in a patient post-operatively.

42. The device of claim 41, wherein the adjustable connector is a nut adapted to be coupled to threads on the post.

43. The device of claim 41, wherein the receiver is capable of rotating post-operatively.

44. A device for slideably coupling a rod to a post forming a portion of a vertebral body stabilizer, comprising:

a body having at least one slot adapted to receive a post to enable medial and lateral adjustability of the body relative to the post and structure for movable engagement of another structure of the vertebral body stabilizer post-operatively; and

the post having at least one stop and adapted to be attached to a spine, wherein the post extends through the at least one slot.

45. The device of claim 44, wherein the post is attached to the body using an adjustable connector such that the body is tightened against the stop on the post thereby preventing the body from moving axially along the post.

46. The device of claim 44, wherein the structure for movable engagement of another structure of the vertebral body stabilizer comprises at least one aperture sized to permit a rod to slide within the at least one aperture generally parallel to a longitudinal axis of the rod and to

restrict movement of the rod generally orthogonal to the longitudinal axis of the rod, wherein the aperture is adapted to allow post-operative sliding of the rod through the aperture.

47. The device of claim 46, wherein the at least one aperture is offset from the at least one slot such that a rod inserted into the aperture is offset from the post positioned in the at least one slot.

48. The device of claim 44, wherein the structure for movable engagement of another structure of the vertebral body stabilizer comprises a gap.

49. The device of claim 44, wherein the structure for movable engagement of another structure of the vertebral body stabilizer comprises a slot.

50. The device of claim 49, further comprising a slider slideably positioned in grooves in the body and positioned proximate to the slot enabling a rod to pass through the slider and the slot and the body to move relative to the body.

51. The device of claim 44, wherein the post is adapted to be tightened to the body at various angles relative to the body.

52. The device of claim 51, wherein the stop has a generally curved outer surface adapted to be tightened against the body.

53. The device of claim 51, further comprising a slider slideably contained in grooves in the body proximate to the slot, wherein the post extends through the at least one slot and the slider, and the slider enables the body to move radially relative to the post.

54. The device of claim 44, wherein the adjustable connector is a threaded nut adapted to be threadably attached to the post.

55. The device of claim 54, wherein the adjustable connector comprises a washer having a curved outer surface enabling the body to be positioned at various angles relative to the post.

56. A device for slideably coupling a rod to a post for stabilizing a vertebral body, comprising:

a post having a head;

a receiver coupled to the head of the post, wherein the receiver is adapted to rotate about at least two axes, to receive a rod, and to prevent the rod from being released from the receiver while enabling the rod to slide within the receiver relative to the post; and

wherein the slideable movement of the rod in the receiver is maintained when the device is in use in a patient post-operatively.

57. The device of claim 56, wherein the head of the post is substantially hemispherical.

58. The device of claim 56, further comprising a threaded member coupled to an inner surface of the receiver.

59. The device of claim 58, further comprising a threaded member coupled to an outer surface of the receiver.

60. The device of claim 56, wherein the receiver is adapted to rotate about at least two axes post-operatively.

61. A device for slideably coupling a rod to a post for stabilizing a vertebral body, comprising:

a first rotatable end having at least one aperture extending through the first rotatable end, wherein the at least one aperture is adapted to receive a post; and

a second rotatable end having at least one aperture extending through the second rotatable end that is adapted to receive a rod and contain the rod in a slideable engagement post operatively.

62. The device of claim 61, further comprising a body to which the first and second rotatable ends are attached.

63. The device of claim 62, wherein at least one of the first and second rotatable ends are threadably coupled to the body.

64. The device of claim 62, wherein at least one of the first and second rotatable ends are coupled to the body with an expandable post.

65. The device of claim 62, wherein at least one of the first and second rotatable ends are coupled to the body with an expandable ring.

66. The device of claim 62, wherein at least one of the first and second rotatable ends are coupled to the body with a pin inserted into a shaft having at least one groove causing the at least one groove to expand.

67. The device of claim 62, wherein the body includes at least one aperture for receiving a post, and the first and second rotatable ends are adapted to slideably receive first and second rods respectively.

68. The device of claim 67, wherein the apertures in the first and second ends are adapted to maintain a slideable relationship with rods in a patient post-operatively.

69. The device of claim 61, wherein the at least one aperture in the first rotatable end is adapted to maintain a slideable relationship with a post in a patient post-operatively.

70. A device for slideably coupling a rod to a post for stabilizing a vertebral body, comprising:

a body having a first aperture adapted to receive a post and a second aperture sized to slideably contain a rod;

the post extending through the first aperture and coupled to the body using a fastener attached to the body;

wherein the fastener is capable of reducing the diameter of the first aperture by tightening a portion of the body against the post; and

wherein the second aperture is sized permit a rod to slide post-operatively within the slot generally parallel to a longitudinal axis of the rod and to restrict movement of the rod generally orthogonal to the longitudinal axis of the rod.

71. A device for slideably coupling a rod to a post for stabilizing a vertebral body, comprising:

a body having a first aperture for slideably receiving a rod coupled to an adjacent vertebrae and allowing the rod to remain in a slideable relationship with the body post-operatively in a patient; and

a post coupled to the body opposite the first aperture and having a connection device for attaching the post to a vertebrae, wherein the post is offset from a longitudinal axis of the first aperture.

72. The device of claim 71, wherein the body is adapted to be positioned generally orthogonal to the post, and the longitudinal axis of the first aperture is generally orthogonal to the body.

73. The device of claim 71, wherein the connection device is selected from the group consisting of a screw, a hook, an adhesive, and an expansion anchor.

74. A device for slideably coupling a rod to a post for stabilizing a vertebral body, comprising:

a first vertebral attachment device having a head with at least one aperture in the head adapted to slideably receive the rod;

wherein the slideable movement of the rod in the at least one aperture is maintained post-operatively in a patient.

75. The device of claim 74, further comprising a body having at least a first aperture and a second aperture, wherein the first vertebral attachment device extends through the first aperture and a second vertebral attachment device extends through the second aperture.

76. The device of claim 74, further comprising at least one releasable connector for preventing the rod from being inadvertently removed from the at least one aperture in the head of the vertebral attachment device.

77. The device of claim 76, wherein the releasable connector is a threaded nut.

78. The device of claim 74, wherein the first vertebral attachment device is selected from the group consisting of a screw, a hook, an adhesive, and an expansion anchor.

79. A device for slideably coupling a rod to a post for stabilizing a vertebral body, comprising:

a first body;

a first slot in an exterior surface of the first body for receiving a rod, wherein the first slot is formed from at least first and second opposing side walls defining a path of movement through which the rod may travel while contained in the first slot; and

a second slot in the exterior surface of the first body for receiving a post, wherein the second slot is formed from at least first and second opposing walls defining a path of movement through which the post may travel while contained in the second slot.

80. The device of claim 79, wherein the body is formed from an elastic material.

81. The device of claim 79, further comprising a second body having first and second slots in an exterior surface of the second body configured to align with first and second slots in the first body.

82. The device of claim 79, wherein the first and second slots on the first body are generally orthogonal to each other.

83. The device of claim 79, wherein the first and second opposing sides forming the first and second slots are at angles relative to each other of between about one degree and about ten degrees.

84. A device for stabilizing a vertebral body, comprising:
an elongated rod having a slot in at least one end of the rod for receiving at least one post adapted to be attached to a vertebrae;
wherein the slot in the elongated rod is adapted to provide a sliding relationship between the elongated rod and the at least one post post-operatively in a patient.

85. A vertebral anchor, comprising:
a means for attaching the vertebral anchor to a vertebral body; and
a means independent of the means for attaching the vertebral anchor to a vertebral body for attaching the vertebral anchor to at least one slideable device to form a slideable relationship with the at least one slideable device post-operatively in a patient.

86. — The device of claim 85, wherein the means for attaching the vertebral anchor to a vertebral body is selected from the group consisting of a post, a screw, a bolt, an adhesive, and a cement.

87. The device of claim 85, wherein the means for attaching the vertebral anchor to slideable devices is selected from the group consisting of an aperture, a slideable surface, a slot, and a groove.